

which convolutionally encodes the data stream. The encoded data stream may then optionally be forwarded to an interleaver 115 for interleaving. If the encoded data stream is interleaved in the transmitter 105 then the receiver 140 must correspondingly de-interleave the encoded data stream. After interleaving, a modulator 120, for example a QPSK modulator 120, modulates the encoded (and optionally interleaved) data stream, which is then forwarded to an inverse Fast Fourier transformer 125, to subject the modulated encoded (and optionally interleaved) data stream to inverse Fast Fourier transformation. The transformed modulated (and optionally interleaved) encoded data stream (signal) is then transmitted, in the present invention, over the air via RF unit 130 and antenna 135.

[023] Correspondingly, receiver 140 accepts multicarrier transmitted signals (data streams) via antennas 145 and RF units 150 and subjects the received multicarrier signals to Fast Fourier transformation using Fast Fourier transformers 155. These transformed signals are concurrently fed into channel estimator 165 and demodulators 160, for example QPSK demodulators. The demodulated transformed signals are combined in maximum ratio combiner 170. The combined demodulated transformed are then optionally de interleaved using de-interleaver 175. The combined demodulated transformed (and optionally de interleaved) signal is then decoded using Viterbi decoder 180. The decoded combined demodulated transformed (and optionally de-interleaved) signal is then fed back into channel estimator 165, which forwards channel estimations, which are added to the transformed signals that are forwarded to demodulators 160.

[024] FIG. 1B shows the baseband processing, in particular, the iterative nature of the receiver portion of the system disclosed herein for near optimal joint channel estimation and data detection for COFDM systems. Channel estimator 165 accepts transformed signal 190. Channel estimations ¹⁹⁴~~198~~ are fed back into channel estimator 165. Channel estimations ¹⁹⁵~~194~~ are fed into decoder 185, which comprises maximum ratio combiner 170 (shown in FIG. 1A), optional de-interleaver 175 (shown in FIG. 1A) and Viterbi decoder 180 (shown in FIG. 1A). Channel estimations 195 are fed into decoder 185 via demodulator 160 (shown in FIG. 1A, but not shown in FIG. 1B for clarity and to highlight the iterative nature of the system), which demodulates the transformed signal using channel characteristics. Decoder 195 also